

What Is Claimed Is:

1 1. A method for conducting an inventory of passenger bags, wherein
2 a bag tag is attached to each bag and each bag tag is permanently assigned a tag
3 identification number (Tag ID) and a manufacturer number, the method
4 comprising the steps of:
5 at a tag reader, transmitting a wake-up signal followed by at least one first clock
6 signal;
7 at each bag tag,
8 incrementing a first tag count in response to said at least one first clock
9 signal, and
10 transmitting the Tag ID assigned to said each bag tag when said Tag ID
11 of said each bag tag corresponds to said first tag count;
12 at said tag reader,
13 incrementing a first reader count in response to said at least one first
14 clock signal,
15 storing a given first reader count when more than one bag tag responds to
16 one of said at least one clock first signal that corresponds to said
17 given first reader count, and
18 transmitting said given first reader count followed by at least one second
19 clock signal; and
20 at each bag tag that responded to said one of said at least one first clock signal
21 that corresponds to said given first reader count,
22 incrementing a second tag count in response to said at least one second
23 clock signal, and
24 transmitting the manufacturer number assigned to said each bag tag that
25 responded to said one of said at least one first clock signal that
26 corresponds to said given first reader count when said
27 manufacturer number of said each bag tag corresponds to said
28 second count.

1 2. The method of claim 1, wherein a ticket tag is attached to each
2 passenger's ticket and each ticket tag is permanently assigned the Tag ID and the
3 manufacturer number of the bag tag attached to the passenger's bag, further
4 comprising the steps of:
5 conducting an inventory of the ticket tags according to the method of claim 1;
6 and
7 comparing said inventory of ticket tags to the inventory of bag tags to ensure that
8 each passenger and said each passenger's bags board the same vehicle.

1 3. The method of claim 1, wherein:
2 each bag tag is permanently assigned a tag ID and a manufacturer number at the
3 time of manufacture.

1 4. The method of claim 1, wherein at least one bag tag includes a
2 sensor, further comprising the step of:
3 at the at least one bag tag, transmitting the contents of said sensor.

1 5. A tag for use in conducting an inventory of passenger bags,
2 wherein each bag is attached to a tag and each tag is permanently assigned a tag
3 identification number (Tag ID) and a manufacturer number, the tag comprising:
4 means for receiving a wake-up signal followed by at least one first clock signal;
5 means for incrementing a first tag count in response to said at least one first clock
6 signal;
7 means for transmitting the Tag ID assigned to the tag when said Tag ID
8 corresponds to said first tag count;
9 means for receiving at least one second clock signal;
10 means for incrementing a second tag count in response to said at least one second
11 clock signal; and

means for transmitting the manufacturer number assigned to the tag when said manufacturer number of said each tag corresponds to said second count.

6. The tag of claim 5, further comprising:
a sensor; and
means for transmitting the contents of said sensor.

7. A reader for conducting an inventory of passenger bags, wherein each bag is attached to a tag and each tag is permanently assigned a tag identification number (Tag ID) and a manufacturer number, the reader comprising:
means for transmitting a wake-up signal followed by at least one clock signal;
means for incrementing a first reader count in response to said at least one first clock signal,
means for receiving a Tag ID transmitted by a tag in response to one of said at least one first clock signal;
means for storing a given first reader count when more than one tag responds to one of said at least one first clock signal that corresponds to said given first reader count;
means for transmitting said given first reader count followed by at least one second clock signal; and
means for receiving a manufacturer number transmitted by a tag in response to one of said at least one second clock signal.

8. A system for locating a tag, wherein each tag is assigned a permanent identification number, the system comprising:
a tag reader that transmits a wake-up signal followed by a time slot number; and
at least one tag that transmits a permanent identification number assigned to said at least one tag when said permanent identification number assigned to said at least one tag corresponds to said time slot number.

1 9. A method for locating a tag, wherein each tag is assigned a
2 permanent identification number, the method comprising the steps of:
3 at a tag reader, transmitting a wake-up signal followed by a time slot number; and
4 at each tag, transmitting a permanent identification number assigned to said each
5 tag when said permanent identification number assigned to said each tag
6 corresponds to said time slot number.

1 10. A system for conducting an inventory of tags, wherein each tag is
2 assigned a permanent identification number, the system comprising:
3 at a tag reader, means for transmitting a wake-up signal followed by at least one
4 clock signal; and
5 at each tag,
6 means for incrementing a tag count in response to said at least one clock
7 signal, and
8 means for transmitting the permanent identification number assigned to
9 said each tag when said permanent identification number of said
10 each tag corresponds to said tag count.

1 11. The system of claim 10, further comprising:
2 at said tag reader, means for transmitting an instruction to perform a tag read.

1 12. The system of claim 10, wherein the duration of tag transmissions
2 is fixed, further comprising:
3 at said tag reader, means for transmitting a further one of said at least one clock
4 signal after the tag transmission duration has elapsed.

1 13. The system of claim 10, further comprising:
2 at said tag reader, means for transmitting a further one of said at least one clock
3 signal after a tag response time has elapsed, wherein said tag response

time is the maximum duration of time between a tag reader transmission and the reception at said tag reader of a corresponding tag transmission.

14. The system of claim 10, further comprising:
at each tag,
a sensor; and
means for transmitting the contents of said sensor.

15. The system of claim 10, wherein:
each tag is permanently assigned said permanent identification number at the time of manufacture.

16. The system of claim 10, wherein said permanent identification number is encrypted.

17. The system of claim 10, further comprising:
means for transmitting a charging signal, thereby energizing the tags.

18. The system of claim 10, further comprising:
at said tag reader, means for incrementing a reader count in response to said at least one clock signal.

19. The system of claim 18, further comprising:
at said tag reader, means for indicating an error when said reader count does not correspond to said permanent identification number.

20. The system of claim 18, wherein:
corresponding ones of said permanent identification number and said reader count are identical.

1 21. The system of claim 18, further comprising:
2 at said tag reader, means for storing a given reader count when more than one tag
3 responds to one of said at least one clock signal that corresponds to said
4 given reader count.

1 22. The system of claim 21, wherein each tag is assigned a second
2 permanent identification number, further comprising:
3 at said tag reader, means for transmitting said given reader count followed by at
4 least one second clock signal; and
5 at each tag that responded to said one of said at least one clock signal that
6 corresponds to said given reader count,
7 means for incrementing a second tag count in response to said at least one
8 second clock signal, and
9 means for transmitting the second permanent identification number
10 assigned to said each tag when said second permanent
11 identification number of said each tag corresponds to said second
12 count.

1 23. The system of claim 22, further comprising:
2 at said tag reader, means for transmitting an instruction to perform a second tag
3 read.

1 24. The system of claim 22, further comprising:
2 at said tag reader, means for incrementing a second reader count in response to
3 said at least one second clock signal.

1 25. The system of claim 24, further comprising:
2 at said tag reader, means for indicating an error when said second reader count
3 does not correspond to said second permanent identification number.

1 26. The system of claim 24, further comprising:
2 at said tag reader, means for storing said given reader count and a given second
3 reader count when more than one tag responds to one of said at least one
4 second clock signal that corresponds to said given second reader count.

1 27. The system of claim 26, wherein each tag is assigned a third
2 permanent identification number, further comprising:
3 at said tag reader, means for transmitting said given reader count and said given
4 second reader count followed by at least one third clock signal;
5 at each tag that responded to said one of said at least one second clock signal that
6 corresponds to said given second reader count,
7 means for incrementing a third tag count in response to said at least one
8 third clock signal, and
9 means for transmitting the third permanent identification number
10 assigned to said each tag when said third permanent identification
11 number of said each tag corresponds to said third tag count.

1 28. The system of claim 27, further comprising:
2 at said tag reader, means for transmitting an instruction to perform a third tag
3 read.

1 29. The system of claim 27, further comprising:
2 at said tag reader, means for incrementing a third reader count in response to said
3 at least one third clock signal.

1 30. The system of claim 29, further comprising:
2 at said tag reader, means for indicating an error when said third reader count does
3 not correspond to said third permanent identification number.

1 31. A method for conducting an inventory of tags, wherein each tag
2 is assigned a permanent identification number, the method comprising the steps
3 of:
4 at a tag reader, transmitting a wake-up signal followed by at least one clock
5 signal; and
6 at each tag,
7 incrementing a tag count in response to said at least one clock signal, and
8 transmitting the permanent identification number assigned to said each
9 tag when said permanent identification number of said each tag
10 corresponds to said tag count.

1 32. The method of claim 31, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a tag read.

1 33. The method of claim 31, wherein the duration of tag transmissions
2 is fixed, further comprising the step of:
3 at said tag reader, transmitting a further one of said at least one clock signal after
4 the tag transmission duration has elapsed.

1 34. The method of claim 31, further comprising the step of:
2 at said tag reader, transmitting a further one of said at least one clock signal after
3 a tag response time has elapsed, wherein said tag response time is the
4 maximum duration of time between a tag reader transmission and the
5 reception at said tag reader of a corresponding tag transmission.

1 35. The method of claim 31, wherein:
2 each bag tag is permanently assigned a tag ID and a manufacturer number at the
3 time of manufacture.

1 36. The method of claim 31, wherein at least one bag tag includes a
2 sensor, further comprising the step of:
3 at the at least one bag tag, transmitting the contents of said sensor.

1 37. The method of claim 31, wherein said permanent identification
2 number is encrypted.

1 38. The method of claim 31, further comprising the step of:
2 transmitting a charging signal, thereby energizing the tags.

1 39. The method of claim 31, further comprising the step of:
2 at said tag reader, incrementing a reader count in response to said at least one
3 clock signal.

1 40. The method of claim 39, further comprising the step of:
2 at said tag reader, indicating an error when said reader count does not correspond
3 to said permanent identification number.

1 41. The method of claim 39, wherein:
2 corresponding ones of said permanent identification number and said reader
3 count are identical.

1 42. The method of claim 39, further comprising the step of:
2 at said tag reader, storing a given reader count when more than one tag responds
3 to one of said at least one clock signal that corresponds to said given
4 reader count.

1 43. The method of claim 42, wherein each tag is assigned a second
2 permanent identification number, further comprising the steps of:

3 at said tag reader, transmitting said given reader count followed by at least one
4 second clock signal; and
5 at each tag that responded to said one of said at least one clock signals that
6 corresponds to said given reader count,
7 incrementing a second tag count in response to said at least one second
8 clock signal, and
9 transmitting the second permanent identification number assigned to said
10 each tag when said second permanent identification number of
11 said each tag corresponds to said second count.

1 44. The method of claim 43, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a second tag read.

1 45. The method of claim 43, further comprising the step of:
2 at said tag reader, incrementing a second reader count in response to said at least
3 one second clock signal.

1 46. The method of claim 45, further comprising the step of:
2 at said tag reader, indicating an error when said second reader count does not
3 correspond to said second permanent identification number.

1 47. The method of claim 45, further comprising the step of:
2 at said tag reader, storing said given reader count and a given second reader count
3 when more than one tag responds to one of said at least one second clock
4 signals that corresponds to said given second reader count.

1 48. The method of claim 47, wherein each tag is assigned a third
2 permanent identification number, further comprising the steps of:
3 at said tag reader, transmitting said given reader count and said given second
4 reader count followed by at least one third clock signal;

5 at each tag that responded to said one of said at least one second clock signal that
6 corresponds to said given second reader count,
7 incrementing a third tag count in response to said at least one third clock
8 signal, and
9 transmitting the third permanent identification number assigned to said
10 each tag when said third permanent identification number of said
11 each tag corresponds to said third tag count.

1 49. The method of claim 48, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a third tag read.

1 50. The method of claim 48, further comprising the step of:
2 at said tag reader, incrementing a third reader count in response to said at least
3 one third clock signal.

1 51. The method of claim 50, further comprising the step of:
2 at said tag reader, indicating an error when said third reader count does not
3 correspond to said third permanent identification number.

1 52. A system for conducting an inventory of tags, wherein each tag is
2 assigned a permanent identification number, the system comprising:
3 at a tag reader,
4 means for transmitting a wake-up signal followed by at least one clock
5 signal, and
6 means for incrementing a reader count in response to said at least one
7 clock signal;
8 at each tag,
9 means for incrementing a tag count in response to said at least one clock
10 signal, and

11 means for transmitting a response signal when said permanent
12 identification number of said each tag corresponds to said tag
13 count;
14 at said tag reader,
15 means for recording said reader count when one of said response signals
16 is received, thereby recording the presence of the tag that
17 transmitted said one of said response signals.

1 53. The system of claim 52, further comprising:
2 at said tag reader, means for transmitting an instruction to perform a tag read.

1 54. The system of claim 52, wherein the duration of tag transmissions
2 is fixed, further comprising:
3 at said tag reader, means for transmitting a further one of said at least one clock
4 signal after the tag transmission duration has elapsed.

1 55. The system of claim 52, further comprising:
2 at said tag reader, means for transmitting a further one of said at least one clock
3 signal after a tag response time has elapsed, wherein said tag response
4 time is the maximum duration of time between a tag reader transmission
5 and the reception at said tag reader of a corresponding tag transmission.

1 56. The system of claim 52, further comprising:
2 at each tag,
3 a sensor; and
4 means for transmitting the contents of said sensor.

1 57. The system of claim 52, further comprising:
2 means for transmitting a charging signal, thereby energizing the tags.

1 58. The system of claim 52, further comprising:
2 at said tag reader, means for storing a given reader count when more than one tag
3 responds to one of said at least one clock signal that corresponds to said
4 given reader count.

1 59. The system of claim 58, wherein each tag is assigned a second
2 permanent identification number, further comprising:
3 at said tag reader,
4 means for transmitting said given reader count followed by at least one
5 second clock signal, and
6 means for incrementing a second reader count in response to said at least
7 one second clock signal;
8 at each tag that responded to said one of said at least one clock signal that
9 corresponds to said given reader count,
10 means for incrementing a second tag count in response to said at least one
11 second clock signal, and
12 means for transmitting a second response signal when said second
13 permanent identification number of said each tag corresponds to
14 said second count; and
15 at said tag reader,
16 means for recording said second reader count when one of said second
17 response signals is received, thereby recording the presence of the
18 tag that transmitted said one of said second response signals.

1 60. The system of claim 59, further comprising:
2 at said tag reader, means for transmitting an instruction to perform a second tag
3 read.

1 61. The system of claim 59, further comprising:

2 at said tag reader, means for storing said given reader count and a given second
3 reader count when more than one tag responds to one of said at least one
4 second clock signal that corresponds to said given second reader count.

1 62. The system of claim 61, wherein each tag is assigned a third
2 permanent identification number, further comprising:

3 at said tag reader,

4 means for transmitting said given reader count and said given second
5 reader count followed by at least one third clock signal, and

6 means for incrementing a third reader count in response to said at least
7 one third clock signal;

8 at each tag that responded to said one of said at least one second clock signal that
9 corresponds to said given second reader count,

10 means for incrementing a third tag count in response to said at least one
11 third clock signal, and

12 means for transmitting a third response signal when said third permanent
13 identification number of said each tag corresponds to said third
14 tag count; and

15 at said tag reader,

16 means for recording said third reader count when one of said third
17 response signals is received, thereby recording the presence of the
18 tag that transmitted said one of said third response signals.

1 63. The system of claim 62, further comprising:

2 at said tag reader, means for transmitting an instruction to perform a third tag
3 read.

1 64. A method for conducting an inventory of tags, wherein each tag
2 is assigned a permanent identification number, the method comprising the steps
3 of:

4 at a tag reader,
5 transmitting a wake-up signal followed by at least one clock signal, and
6 incrementing a reader count in response to said at least one clock signal;
7 at each tag,
8 incrementing a tag count in response to said at least one clock signal, and
9 transmitting a response signal when said permanent identification number
10 of said each tag corresponds to said tag count; and
11 at said tag reader,
12 recording said reader count when one of said response signals is received,
13 thereby recording the presence of the tag that transmitted said one
14 of said response signals.

1 65. The method of claim 64, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a tag read.

1 66. The method of claim 64, wherein the duration of tag transmissions
2 is fixed, further comprising the step of:
3 at said tag reader, transmitting a further one of said at least one clock signal after
4 the tag transmission duration has elapsed.

1 67. The method of claim 64, further comprising the step of:
2 at said tag reader, transmitting a further one of said at least one clock signal after
3 a tag response time has elapsed, wherein said tag response time is the
4 maximum duration of time between a tag reader transmission and the
5 reception at said tag reader of a corresponding tag transmission.

1 68. The method of claim 64, further comprising the steps of:
2 at each tag,
3 sensing an external condition; and
4 transmitting information regarding said external condition.

1 69. The method of claim 64, further comprising the step of:
2 transmitting a charging signal, thereby energizing the tags.

1 70. The method of claim 64, further comprising the step of:
2 at said tag reader, storing a given reader count when more than one tag responds
3 to one of said at least one clock signal that corresponds to said given
4 reader count.

1 71. The method of claim 70, wherein each tag is assigned a second
2 permanent identification number, further comprising the steps of:
3 at said tag reader,
4 transmitting said given reader count followed by at least one second clock
5 signal, and
6 incrementing a second reader count in response to said at least one second
7 clock signal;
8 at each tag that responded to said one of said at least one clock signal that
9 corresponds to said given reader count,
10 incrementing a second tag count in response to said at least one second
11 clock signal, and
12 transmitting a second response signal when said second permanent
13 identification number of said each tag corresponds to said second
14 count; and
15 at said tag reader,
16 recording said second reader count when one of said second response
17 signals is received, thereby recording the presence of the tag that
18 transmitted said one of said second response signals.

1 72. The method of claim 71, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a second tag read.

1 73. The method of claim 71, further comprising the step of:
2 at said tag reader, storing said given reader count and a given second reader count
3 when more than one tag responds to one of said at least one second clock
4 signal that corresponds to said given second reader count.

1 74. The method of claim 73, wherein each tag is assigned a third
2 permanent identification number, further comprising the steps of:
3 at said tag reader,
4 transmitting said given reader count and said given second reader count
5 followed by at least one third clock signal, and
6 incrementing a third reader count in response to said at least one third
7 clock signal;
8 at each tag that responded to said one of said at least one second clock signal that
9 corresponds to said given second reader count,
10 incrementing a third tag count in response to said at least one third clock
11 signal, and
12 transmitting a third response signal when said third permanent
13 identification number of said each tag corresponds to said third
14 tag count; and
15 at said tag reader,
16 recording said third reader count when one of said third response signals
17 is received, thereby recording the presence of the tag that
18 transmitted said one of said third response signals.

1 75. The method of claim 74, further comprising the step of:
2 at said tag reader, transmitting an instruction to perform a third tag read.

1 76. A method for producing a tag for use in electronic inventory,
2 comprising the steps of:

3 manufacturing an application-specific integrated circuit (ASIC) including
4 inventory response circuitry;
5 programming said ASIC with a permanent identification number;
6 preprinting an antenna pattern and bonding pads on a flexible substrate using a
7 conductive material; and
8 flip-chip bonding said ASIC to said bonding pads using a conductive adhesive.

1 77. The method of claim 76, further comprising the step of:
2 applying an attachment means to a first portion of the tag, whereby said first
3 portion may be joined to a second portion of the tag to close the tag about
4 an object to be tagged; and
5 perforating said tag so that any attempt to remove a close tag from a tagged
6 object renders the tag inoperative.

1 78. The method of claim 76, wherein
2 said attachment means is an adhesive.

1 79. The method of claim 76, further comprising the steps of:
2 preprinting an anode on a first portion of said flexible substrate;
3 preprinting a cathode on a second portion of said flexible substrate;
4 applying at least one of a dielectric material and an electrolytic material to at least
5 one of said anode and said cathode; and
6 applying an attachment means to at least one of said anode and said cathode;
7 whereby a power supply means is formed by the subsequent attachment of said
8 anode and said cathode using said attachment means, and said power
9 supply means is destroyed by any attempt to thereafter detach said anode
10 and said cathode.

1 80. The method of claim 77, wherein
2 said attachment means is an adhesive.

1 81. The method of claim 76, further comprising the step of:
2 hermetically sealing said ASIC.

1 82. The method of claim 76, further comprising the steps of:
2 including at least one sensor on said tag.

3
4 83. The method of claim 76, further comprising the steps of:
5 testing the operability of the tag; and
6 marking the tag if the tag is inoperable.

1 84. A tag produced by the method of claim 76.

1 85. A tag produced by the method of claim 77.

1 86. A tag produced by the method of claim 78.

1 87. A tag produced by the method of claim 79.

1 88. A tag produced by the method of claim 80.

1 89. A tag produced by the method of claim 81.

1 90. A tag produced by the method of claim 82.

1 91. A tag produced by the method of claim 83.

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